

Tracking Sage Grouse Survival

Research Project Provides New Insight into Lives of North Dakota's Largest Grouse

Story and Photos by Craig Bihrlé

A grouse person can always sleep in May.

Those words of forewarning from a graduate school advisor helped prepare Katie Brunson for two years of research designed to answer questions about North Dakota's declining sage grouse population.

The advice proved accurate as sage grouse gather in March and April on and around traditional courtship and breeding grounds called leks. It's a short time frame when their behavior is predictable enough so they are more readily captured and fitted with radio-collars that allow researchers to track their movements.

The trapping effort took place at night. Monitoring the birds' whereabouts and other tasks occupied the days. While Brunson and her assistants trapped and collared 20 hen sage grouse each April in 2005 and 2006, their work was almost nonstop. "You get two hours of sleep and you go," Brunson said. "You just live off of adrenaline, honestly."

In the wildlife profession, that's what graduate student researchers do. They spend long hours in the field over a couple of years, observing animals and their surroundings, followed by long hours at a computer compiling and analyzing information. The final product is a master's thesis or doctoral dissertation designed to help state or federal agencies manage fish or wildlife.

The North Dakota Game and Fish Department has decades of sage grouse population information based on annual counts of male birds on leks, and age and sex information from birds taken by hunters each fall. During the past couple of decades, the number of leks, and the number of male grouse visiting leks, has declined considerably. To try to find out why, the Game and Fish Department contracted with South Dakota State University to develop a research project, led by Brunson and doctoral candidate Chris Swanson.

"Except for the lek and hunter harvest information, we've never had any work on sage grouse," says Stan Kohn, the Game and Fish Department's upland game management supervisor. "We're hoping to find out what these birds are doing throughout the year."

"We're really interested in the total life history of the species," Swanson added. "We're trying to cover as much as we can about this bird, to basically allow it to persist in North Dakota."

Radio-collars provide the technology to accomplish that.

A Good Night's Work

Each spring, sage grouse gather on leks as part of their mating ritual, with males displaying and females choosing mates. After choosing a mate, the female selects a nest site, begins egg laying, and stops her frequent visits to the lek.

Before nest initiation, though, female sage grouse tend to roost in sagebrush close to the lek. At night, Brunson and her assistants would scour the area surrounding a lek, using powerful spotlights to detect reflections in birds' eyes. When a bird was discovered, one person would keep the light shining on it while another would make the capture using a long-handled net.

On some nights, several hours of work would yield a bird or two, on other nights, nothing. Regardless, when dawn came Brunson was out counting male birds on leks, tracking hens that already had radios, contacting landowners for permission to search for birds, and entering data from the previous day.

When all 20 birds for the field season were on the air, the night work ended, but the days were still full.

Sage Grouse Slide

The extreme southwestern corner of North Dakota is on the edge of sage grouse country. These 3-7 pound birds are much more numerous in Montana, Wyoming, Colorado and other Western states, but across their range the population has declined to the

Katie Brunson (left) and Matt Bahm attach a radio-collar to a female sage grouse. Efforts to trap grouse took place well after dark.

Below: Sage grouse with collar attached.



point where it is now closely monitored by state and federal wildlife agencies.

In North Dakota, the sage grouse is designated as a Level 2 Species of Conservation Priority. As such, it is a high enough priority that Game and Fish is contributing funding for the study.

Department biologists started counting male sage grouse on leks in the early 1950s. The highest bird count was 542 in 1953; the low mark was 111 birds in 1996. In recent years the number has averaged fewer than 200 males.

Part of the reason for the population decline is simply a loss of sagebrush habitat. Sage grouse are not very adaptable, Kohn said, since they depend almost entirely on sagebrush for food and shelter for much of the year. That's in contrast to sharp-tailed grouse, also a North Dakota native, which uses a wide variety of habitats and can adapt to waste grains from agricultural operations as an alternative food source.

Over the last 50 years landowners have converted perhaps thousands of acres of North Dakota sagebrush prairie from grazing land to cropland. That's a loss for sage grouse. New programs are underway that will hopefully maintain current acreage, Kohn said, and eventually help restore some of the lost sagebrush. "But it's not like grass," he stated. "You can replant it, but it takes a long time to get to any size where it's a benefit to sage grouse."

Loss of habitat, however, may not be the only factor influencing North Dakota's sage grouse, and the study will help identify those.

Grouse on the Air

Once a female grouse had a radio-collar attached, Brunson tried to find it and log its location every few days. The radio signals led Brunson or her assistants to hens on nests, then allowed them to follow along after the eggs hatched and the hen started brood-rearing. They flushed the broods once a week to count the chicks.

Five or six weeks after hatching, several hens with broods were pinpointed and captured – more night work – so the young birds could get their own collars. In mid-August, Brunson handed over the receiver to Swanson, who monitored the birds daily from sun up to sun down through fall and winter for two years.

Most nest and other location records were combined with site specific habitat analysis for which Swanson measured density of sagebrush plants, sagebrush height, and grass and other ground cover in addition to sagebrush. Adequate grass is important for helping hide nests. Leafy plants called forbs, as well as insects, are important summer food sources.

Katie Brunson used a spotlight to locate roosting sage grouse at night. Detecting reflections from a bird's eye, researchers used a long-handled net to capture birds.



New Information: Nest Success

In general, North Dakota sage grouse initiate nests at about the same or even higher rate than grouse in other states. For her part of the study, Brunson found only three hens out of 40 that did not initiate a nest.

High nest initiation, however, did not carry over into high nest success. Biologists call a nesting attempt successful if at least one egg hatches. While average nest success for sage grouse rangewide is nearly 50 percent, Brunson's birds hatched only 31 percent of their nests. That's a concern in North Dakota, Brunson said, because much higher nest success is needed to maintain a stable population.

As for most ground-nesting birds, predation is the biggest reason sage grouse nesting attempts fail. When that happens in other sage grouse states, hens often try another attempt. Of the North Dakota birds, however, only two female sage grouse tried to initiate a second nest.

"Our birds do not have the nutrition quality that they need to pull off another nesting attempt," Brunson stated. "That relates to the herbaceous understory. They don't have enough forbs available to develop enough reserves to pull off a second nest."

New Information: Brood Survival

Prior research from other states suggests that of all sage grouse eggs that hatch, about 30 percent of the chicks need to survive to adulthood for the population to remain stable. Brunson's research indicated that only

17 percent of chicks that hatched in 2005 survived, while only 13 percent made it in 2006.

"That is a big concern," she said. "We are not seeing recruitment of chicks into the next population. We could relate that to the habitat quality, I feel, in North Dakota."

Sagebrush plants in North Dakota typically don't grow as high, or as wide as they do in the core sage grouse range. That could mean North Dakota birds are more exposed to both aerial and ground predators. The study documented predation by golden eagles, fox and coyotes, while it was difficult to determine the culprit in many other chick deaths.

"I think it would fit the trend of habitat on the fringe," Brunson said of North Dakota sagebrush. "The density is lacking. It's very patchy ... it's really easy pickings for a lot of the predators out there."

Another discovery, or perhaps more appropriately a verification of a widely held theory, is that sage grouse are susceptible to West Nile virus. As summer turned to fall and Brunson turned the tracking equipment over to Swanson, radio-collared chicks continued to die even as they reached 6-8 weeks of age, which is typically the age at which mortality starts dropping off considerably.

During the two study summers, West Nile virus was positively identified as the cause of death in one adult and one juvenile sage grouse. Swanson says, however, that finding a dead grouse fully intact before predators can scavenge the carcass is critical for testing for West Nile virus. "A lot of times you'd just find a dried out specimen," he said, for which an

exact cause of death could not be determined. "Right now we know it occurs, but it's hard to say to what extent."

Swanson noted a study in another state that suggests 25 percent sage grouse mortality during brood rearing season from West Nile alone. In addition, his research noted a marked decline in mortalities after mid-October – the time of year when the first hard freeze usually arrives and kills all the mosquitoes.

Hunting is apparently not a significant mortality factor. In two years, hunters did not take even one bird – adult or juvenile – wearing a radio-collar.

Interestingly, North Dakota sage grouse mortality is also low during winter. From mid-October on the birds eat sagebrush leaves exclusively, Swanson said, and they gang up in large flocks, typically 20-40 birds, but occasionally more than 100.

Swanson says that previous research has shown that sage grouse actually gain weight during the winter.

New Information: Sage Grouse Movement

Sage grouse don't migrate to warmer climates, but they do move around some. One of the study findings is that North Dakota sage grouse move back and forth across the Montana border.

All hens were initially captured in North Dakota. In the first year, almost all of them stayed in North Dakota to nest and raise their broods. By winter, however, about 15 percent of radio locations were in Montana. Some of those birds stayed in Montana for the next breeding and nesting season. During the brood-rearing phase in 2006, more than 60 percent of the locations were coming from Montana.

The grouse certainly don't know they're crossing state lines, and there's not an easily discernable difference between sagebrush habitat on either side of the border. But Swanson's research suggests the movements are not necessarily random. On closer inspection, sagebrush shrub density measured near bird locations was somewhat higher in Montana.

"There's a general trend, and an increase in the number of locations of birds in Montana," Swanson said. "Maybe it's slightly better habitat in Montana ... but we don't know exactly why."

In addition to attaching a radio-collar, female sage grouse were weighed on a small field scale.



New Information: Sage Grouse Brood Breakup

At some point in any species' life cycle, the young must leave the adults. For game birds, it's called brood breakup. Knowing precisely when that occurs for sage grouse is important for North Dakota because of the way the sage grouse hunting season is structured.

Until a few years ago, the state's sage grouse season ran in early September for a few days following opening weekend of sharp-tailed grouse season. Biologists were concerned that hunters took too many adult hens during that early season. Because young birds were usually still with hens, when birds flushed, hunters often shot the largest one – typically the adult hen.

Limited previous research only suggested timing of sage grouse brood breakup, but Game and Fish used that theory as the basis for moving the season back to late September, when it was more likely that more young birds would be out on their own, and therefore not in a family group that included an obviously larger bird.

Swanson's findings validate that theory. While not all broods are off on their own by the time North Dakota's hunting season starts, the process is well advanced com-

pared to early September. "Our research on brood breakup is going to be pretty new stuff to the sage grouse world," Swanson noted. "It really could improve our knowledge of the species."

And in this case, that knowledge has direct benefit to the Game and Fish Department. Moving the season to later in September has reduced the harvest of adult females, Kohn said, so it is no longer a major concern.

Next Information: More Questions to Answer

In many new investigations, finding information often leads to more questions. Continuing research in North Dakota will partially focus on how sage grouse are reacting to many new roads and structures in their home range that are part of expanding oil and gas development.

North Dakota's sage grouse live only in Bowman and Slope counties, where the amount of sagebrush habitat has declined in the past half-century. Continuing research is designed to determine how much these birds are influenced by recent energy development activities (inset) in the region.

